Highly Sensitive Photon Counting Detectors for Deep Space Optical Communications, Phase II

Completed Technology Project (2005 - 2006)

Project Introduction

This project will focus on fabricating and optimizing a photodetector that utilizes the emerging technology of internal discrete amplification to create photon-counting sensitivity detectors with very high gain, ultra low noise, high quantum efficiency and GHz bandwidth for optical communications in the spectral range of 1.06 ?m to 1.6 ?m. Extensive modeling during Phase I of this project has permitted to optimize the design and develop manufacturing steps to produce such a photodetector. The detectors will have performance parameters significantly superior to those of conventional avalanche photodiodes and photomultiplier tubes to and should meet and exceed NASA stated mission goals of boosting data transfer rates by a factor of 10-100 relative to the current state of the art. The expected performance parameters include a GHz bandwidth (with a 10 GHz long term goal), gain of 10,000 to 100,000, excess noise factor less than 1.07, saturation levels greater than 50Mcounts/s (higher expected), and flexibility in the choice of active area size and shape, including the ability to create detector arrays. These new capabilities could lead to important advances in deep space and other optical communication applications.

Primary U.S. Work Locations and Key Partners

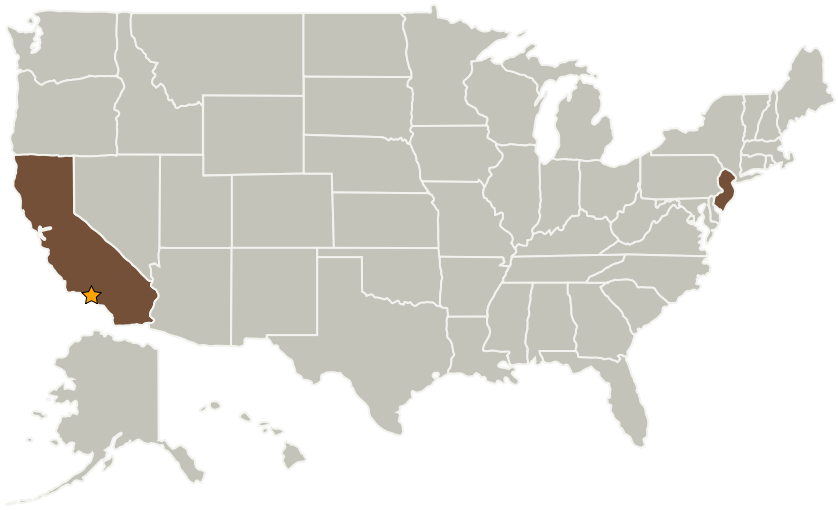

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Amplification Technologies, Inc.	Supporting Organization	Industry	Paramus, New Jersey

Primary U.S. Work Locations	
California	New Jersey

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes